

(9) CLAIMS

1. A process for fabricating a mandrel comprising:

forming a first structure having a substantially planar electrically conductive surface having a plurality of electrically non-conductive mandrel associated first features affixed distributively across said conductive surface;

using said first structure, forming a complementary second structure such that said complementary second structure has a plurality of second features complementary of said first features; and

using said second structure, forming the mandrel having third features wherein said third features define shape, location and geometry of features of an electroform created using said mandrel.

2. The process as set forth in claim 1 wherein forming a first structure comprises: providing a substantially planar glass substrate;

forming a substantially planar first electrically conductive material layer on said substrate; and

forming said plurality of electrically non-conductive mandrel associated first features on said first electrically conductive material layer.

3. The process as set forth in claim 2 wherein forming said plurality of electrically non-conductive mandrel associated first features comprises:

forming a layer of photoresist material superjacent first electrically conductive material layer;

masking said photoresist material for forming said electrically non-conductive  
mandrel associated first features;  
exposing said photoresist; and  
stripping photoresist material not conforming to said electrically non-conductive  
5 mandrel associated first features.

4. The process as set forth in claim 3 wherein forming a complementary second  
structure comprises:

electroforming a second electrically conductive material layer and thereby  
forming said complementary second features such that said second electrically  
10 conductive material layer has a thickness greater than said electrically non-conductive  
mandrel associated first features and predeterminedly related to said third features;  
and

stripping said second electrically conductive material layer from said first  
structure.

15 5. The process as set forth in claim 4 comprising:

providing a backing for said second electrically conductive material layer for  
added strength and rigidity of said complementary second structure.

6. The process as set forth in claim 4 wherein said forming the mandrel comprises:  
using the complementary second structure, forming a glass layer on said second  
20 electrically conductive material layer such that said third features are formed on a  
surface of the glass layer adjacent to and conformed to said second conductive

material layer plurality of second features.

7. The process as set forth in claim 6 comprising:

forming a second conductive material layer on said surface of the glass layer;

and

forming a non-conductive material layer on said third features superjacent said second conductive material layer.

8. A process for fabricating an ink-jet printhead mandrel comprising:

forming a first structure having a substantially planar metalized first surface having a plurality of dielectric first features distributed across said first surface;

using said first structure, forming a complementary second structure such that said complementary second structure has a plurality of second features complementary of said first features; and

using said second structure, forming the mandrel having third features wherein said third features define shape, location and geometry of features of an ink-jet printhead to be electroformed using said mandrel.

9. The process as set forth in claim 8 wherein forming a first structure comprises:

providing a substantially planar glass substrate;

forming a substantially planar first metal layer on said substrate; and

forming said plurality of dielectric first features on said first metal layer.

10. The process as set forth in claim 9 wherein forming said first features comprises:  
forming a layer of photoresist material superjacent first metal layer;  
masking said photoresist material for forming said first features;  
exposing said photoresist; and  
stripping photoresist material not conforming to said first features.

11. The process as set forth in claim 10 wherein forming a complementary second structure comprises:

electroforming a second metal layer on said first structure and thereby forming said complementary second features such that said second metal layer has a thickness greater than said electrically non-conductive mandrel associated first features and predeterminedly related to said third features; and

stripping said second metal layer from said first structure.

12. The process as set forth in claim 11 comprising:

providing a backing for said second metal layer for added strength and rigidity of said complementary second structure.

13. The process as set forth in claim 11 wherein said forming the mandrel comprises:

using the complementary second structure, melting a glass layer onto said second metal layer such that said third features are formed on a surface of the glass layer adjacent to and conformed to said second metal layer second features.

14. The process as set forth in claim 13 comprising:  
forming a third metal layer on said surface of the glass layer; and  
forming a dielectric film on said third features superjacent said third metal layer.
15. An ink-jet mandrel made in accordance with the process as set forth in claim 8.
- 5 16. An ink-jet printhead fabricated on the mandrel as set forth in claim 15.
17. An ink-jet printhead mandrel comprising:  
a glass substrate having a plurality of glass-formed mandrel features for  
electroforming an ink-jet printhead construction hereon;  
a metal layer superjacent the glass substrate conforming to said features; and  
10 a dielectric layer superjacent the metal layer only on and conforming to said  
features.
18. The mandrel as set forth in claim 17 wherein said features are related to  
printhead orifice size and shape in accordance with the equation:

$$D_{\text{bore}} = D_{\text{base}} - 2T \tan \Theta.$$